at some period been the scene of some dreadful murder, or other crime, by which it has been poluted, and it was supposed that he could not be dispossessed of his thus strangely acquired tenement, or the place itself freed from its defilement, except by some mysterious mode of exorcism and subsequent purification, known only to the priests, who failed not to prove the high value which they set upon this secret knowledge, by the exorbitancy of their demand, whenever applied to to exert their sacerdotal influence. In accordance with this belief, a neighbouring monk was applied to, and when the terms, upon which he agreed to expel the evil spirits were finally settled, he took up his residence at the house; he went through a long and tedious ordeal of preparation, such as fasting, praying, and other sorts of penitential duties for some weeks. At length, when the necessary preliminaries were arranged, he took up his night's abode in the room; he brought with him his missal, a pair of wax candles, and a human skull—what use he made of the skull, could never be discovered. On the first night nothing remarkable happened; on the second the noise was long and more confused than usual; on the third night, which was to determine the event, the noises increased, a dense body of smoke issued from the room, and towards the approach of morning, a terrible crash, which shook the house to its foundation, was heard, and the priest came out exulting in his victory; the devil had sprung through the wall and had caused the fissure,which never could befilled up while one stone of the old wall remained. The priest was handsomely rewarded, the fame of the occurrence soon spread over the kingdom—long was the spot through which the devil had escaped pointed out to the spectators. The form of all, however, is now changed; never since have any noises been heard, and people sleep in it, forgetful that even once it had been the scene of so extraordinary an occurrence.

W. R.

CATECHISM OF NATURAL PHILOSOPHY.*

Those of our readers who took the second volume of the Journal, will remember that we commenced our articles on "Simple Science," by giving, in successive numbers, by way of question and answer, a very simple explanation of the first principles of several of the most interesting of the arts and sciences. In the little work before us there is a more complete following out of our plan than we were able to accomplish. It is the second part of a series of little works on elementary knowledge, which are to embrace the various arts and sciences; and which will, when completed, form a library, at a very cheap rate, of the first importance to the mechanic and artizan, as containing, within a very brief space, more information of a useful and practical kind than could have been collected a few years since from several costly and ponderous volumes.

Part II. the number before us, "contains Hydrostatics, Hydraulics, Pneumatics, and Optics. Under Hydrostatics is given an analysis of fluid pressure on the bottoms and sides of containing vessels; an account of Brahmah's hydrostatic press; the effects of the pressure of a fluid on bodies immersed in it; the theory of specific gravity; the construction and use of the hydrometer; and an explanation of the principle upon which the strength of spirit is estimated.

"Under Hydraulics is considered the velocity with which water would issue under a given head pressure; the mode in which it is conducted from one place to another; how it is carried into the different elevations of a building, and made itself to regulate the necessary supply. Under this head, also, is given an account of some of the more remarkable hydraulic machinery, such as the water-wheel, Barker's mill, the cochlion or water-snail, and the hydraulic ram.

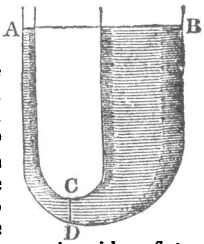
"Under Pneumatics is considered the decreasing density of the air as the height above the earth's surface increases; the rise of water after a piston; a proof given that no such agent exists in nature as suction; an account of the air-pump, condenser, and air-gun; an explanation of pumps for raising water; of the stomach-pump; of the fire-engine; of syphons; and, lastly, of the construction and action of the barometer.

"Under the last head, Optics, there is given an explanation of plane, convex, and concave mirrors; of the effects of refraction on the true position of a point, as exemplified in the apparent position of a fish in the water, &c.; the oval form of the sun and full moon in the horizon; of lenses and their effects; of the eye; of spectacles and their uses; of the telescpoe, microscope, and mode of computing their power; and, lastly, an account of the construction and use of some of the more amusing optical instruments, such as the camera obscura, camera lucida, and the magic lantern."

From the first and last sections, "Hydrostatics" and "Optics," we take a specimen of the work. The descriptions appear to have been compiled with considerable care by a person qualified for the task. Indeed, there can be no doubt that the author is well acquainted with the *theory* of the subjects on which he writes—with the practical demonstration he seems not to be quite so conversant.

Having explained how it is that a fluid particle, situated within a mass of fluid, is pressed equally in every direction, he observes, in reply to the question, "Does the equal diffusion of fluid pressure lead to any other result particularly remarkable?"—

"It leads to this among others, that in communicating vessels a fluid will stand to the same level in all, however different these may be in calibre or bore. Thus, in the vessel ADB, consisting of the two branches AD and DB, a fluid will stand at the same level in A as in B, however much more fluid BD may contain than AD.



To see through this, conceive CD to be the lowest vertical stratum in the vessel. Then, since the pressure on a fluid particle is in proportion to the depth of that particle below the surface of the fluid, the pressure on opposite sides of the stratum CD will be in proportion to the altitudes of the fluid in the branches AD and DB; and hence when these altitudes are equal, the pressure on opposite sides of CD will be equal, and the fluid will be at rest.

"Q. This is hardly what could have been expected: the reasoning, however, is quite conclusive.

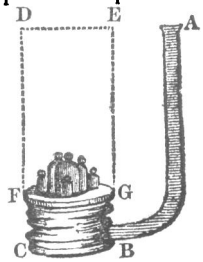
"A. Another still more remarkable fact, and one, too, arising out of the same principle of the equal diffusion of fluid pressure, is what is usually called the 'Hydrostatic Paradox;' viz. 'that any quantity of fluid, however small, may be made to balance any quantity, however great.'

"Q. This is certainly a contradiction in terms.

"A. It is rigidly true, as you will perceive in the following manner:—Suppose that BD in the last figure is a vessel sufficiently capacious to contain the given great quantity; then, in order to make the given small quantity balance it, all that is necessary is to take a tube AD of a diameter so small that the given small quantity may stand at the same level with the given great quantity; in which case, of course, an equilibrium will take place between them.

"Q. Is this principle of a fluid standing at the same level in communicating vessels, rendered available in the mechanical arts?

"A. It is in many instances, which will be mentioned in their proper places. In the mean time, as illustrative of the principle, though of no great practical importance in itself, we may mention the hydrostatic bellows. This machine consists of two circular boards FG and CB, connected together by means of leather, as in the common bellows; a tube of metal is inserted between the boards, and thus communicates with the space which they enclose. If water be poured into the tube at A, it will, when accumulated in sufficient quantity, fill up the space between the boards, and finally exert a very considerable upward pressure on the upper board FG, from the effort which it makes to stand to the same

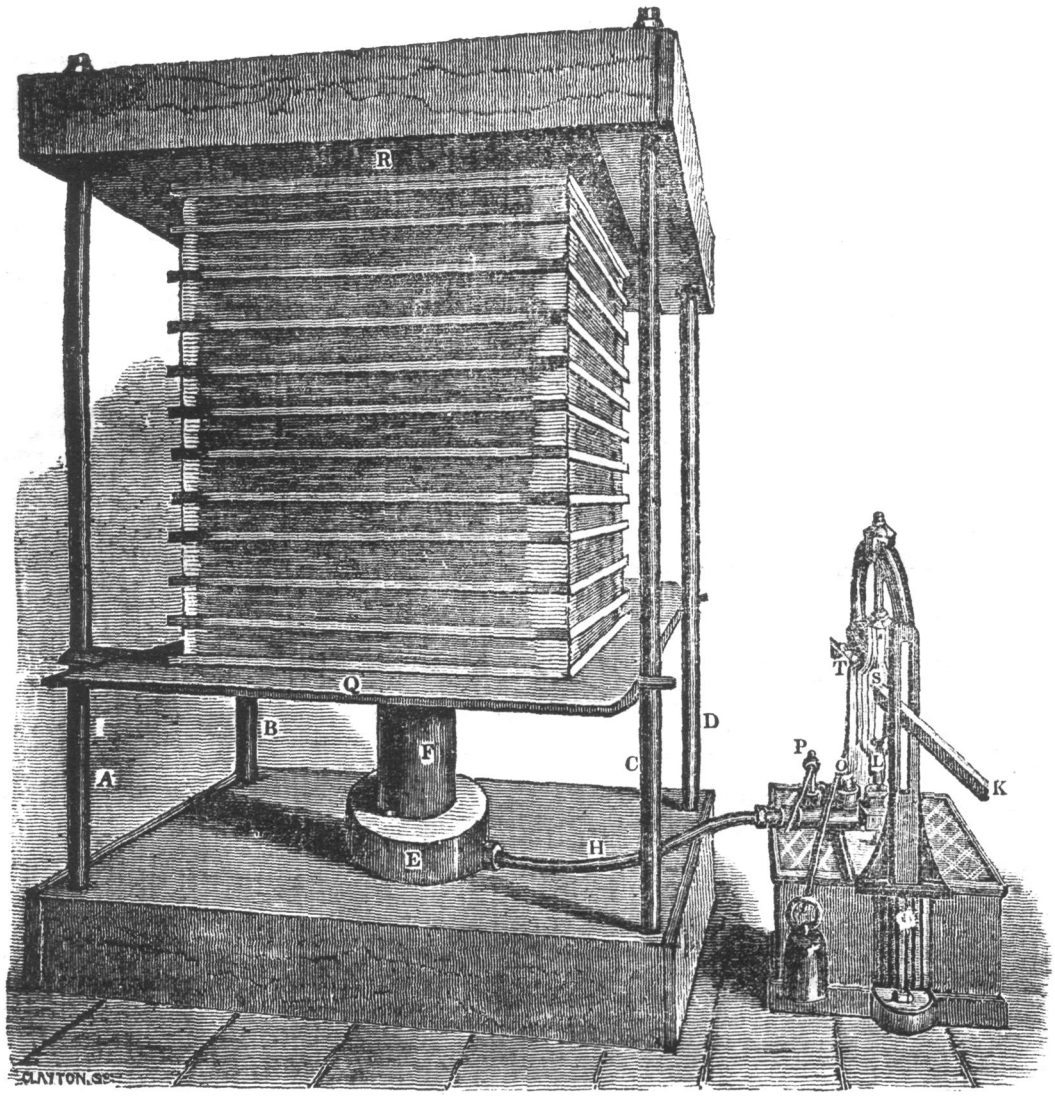


* A Catechism of Natural Philosophy. Part II. By George Lees, A. M. Edinburgh; Oliver and Boyd; London: Simpkin and Marshall.

level in the bellows that it does in the tube. If the tube be filled to the top A, then, of course, the pressure produced by that column would balance a column DG of the same height, if the vessel were continued; and hence the upward pressure on the interior surface of the upper board is such as would support any weight not greater than the weight of the water in the column DEGF."

Now all this is very correct—but then comes the demonstration as to the hydrostatic press; and here we find him at fault, as we venture to affirm, no one, either from the drawing of the press, or the description given in the little book, could form any thing like a correct idea of how it is worked. Considering the Hydrostatic press one of the most curious though simple machines which this "great age of invention" has produced, we annex a description and drawing of one of those at present used in our own office, which, by the power of one or two men at the pump handle, brings a pressure equal to three hundred tons weight on the paper pressed.

HYDROSTATIC PRESS.



ABCD are four stong iron pillars, which passing through two square plates of cast metal, the head and base, and fastened by transverse pins, form a frame of great strength. Inside the frame is fixed a piece of hollow metal E, forming a cylinder of considerable thickness, into which falls F, a ram or plug, made perfectly air and water tight, by means of a leather ring. Connected to the cylinder is a small iron pipe, H, which it will be perceived is also connected to a force pump, worked in the usual way by the lever KS, and supplied with water from the small cistern underneath, and of which L is the piston. There are two valves, the one placed in the connecting pipe of the pump, and the other under the pump. O is a safety valve. P is a small aperture, opened by a screw valve, and by which the water is let back into the cistern when emptying the press. When, by the working of the pump, the cavity in cylinder E is filled with water, the pressure on the surface will, of course, act upon the stem of the ram or plug, F, and forcing upwards, will consequently give the pressure to any substance placed between the plates Q and R; and the ring inside the cylinder, being formed of a piece of leather doubled together, the water when forced up between the cylinder and ram, presses the leather against both, and thus renders the tube air and water tight.

"To estimate this pressure, we must keep in mind that a fluid diffuses a pressure equally in all directions; by consequence, whatever pressure the piston, L, conveys to a fluid particle below it, that very same pressure will be conveyed to every particle below the stem F; and hence that the pressure of the water upon F will be so much greater than the pressure of the piston L upon the water, as the surface of F, upon which the water acts is greater than the surface of the water upon which the piston L acts. For example, if the surface of F were ten times the surface of the piston L, then a downward